

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (withdrawn): A magnetic head comprising:
2 a read sensor including a free magnetic layer;
3 the magnetic head also including a hard bias structure being disposed in side regions
4 located at side edges of said free magnetic layer;
5 said hard bias structure including a seed layer and a hard bias layer;
6 wherein said free magnetic layer has a midplane thereof, and said hard bias layer has a
7 midplane thereof, and wherein said free magnetic layer midplane and said hard bias layer
8 midplane are approximately coplanar.
- 1 2. (withdrawn): A magnetic head as described in claim 1 wherein said hard bias layer is
2 deposited next to side edge portions of said free magnetic layer.
- 1 3. (withdrawn): A magnetic head as described in claim 1 wherein said seed layer has a
2 thickness of approximately 5-40 nm and said hard bias layer has a thickness of approximately 5-
3 30 nm.
- 1 4. (withdrawn): A magnetic head as described in claim 1 wherein said seed layer has an
2 upper surface that has been ion milled.
- 1 5. (withdrawn): A magnetic head as described in claim 1 wherein said seed layer is
2 comprised of a first seed layer portion and a second seed layer portion, where said first seed layer
3 portion has an ion milled upper surface upon which said second seed layer portion is disposed.

1 6. (withdrawn): A magnetic head as described in claim 5 wherein said second seed layer
2 portion is approximately 4-10 nm thick.

1 7. (withdrawn): A magnetic head as described in claim 5 wherein portions of said second
2 seed layer are disposed against side edge portions of said free magnetic layer.

1 8-13. (cancelled):

1 14. (withdrawn): A hard disk drive including a magnetic head comprising:
2 a bottom magnetic shield layer (S_1);
3 a bottom insulation layer (G_1);
4 an antiferromagnetic pinning layer being fabricated above said G_1 layer;
5 pinned magnetic layers being fabricated above said antiferromagnetic pinning layer;
6 a spacer layer being fabricated above said pinned magnetic layers;
7 a ferromagnetic free magnetic layer being fabricated above said spacer layer, said free
8 magnetic layer having a midplane thereof;
9 a cap layer being fabricated above said free magnetic layer;
10 a top insulation layer (G_2) being fabricated above said cap layer;
11 a top magnetic shield layer (S_2) being fabricated above said G_2 layer;
12 a hard bias structure being fabricated upon portions of said G_1 layer, said hard bias
13 structure including a seed layer and a hard bias layer, and wherein said hard bias layer has a
14 midplane that is disposed at a horizontal level within the magnetic head that is approximately
15 coplanar with said midplane of said free magnetic layer.

1 15. (withdrawn): A magnetic head as described in claim 14 wherein said hard bias layer is
2 deposited next to a side edge portion of said free magnetic layer.

1 16. (withdrawn): A magnetic head as described in claim 15 wherein said seed layer has a
2 thickness of from approximately 5-40 nm, and wherein said hard bias layer has a thickness of
3 approximately 5-30 nm.

1 17. (currently amended): A method for fabricating a magnetic head comprising:
2 fabricating a plurality of thin film layers to create a read sensor, said read sensor
3 including a first insulation (G1) layer, a pinned layer, a pinning layer, a spacer layer, a free
4 magnetic layer having a midplane thereof, and a cap layer;
5 milling said plurality of thin films such that a central sensor region is protected from
6 milling and unprotected outer regions are milled down to said G1 layer, such that said free
7 magnetic layer is formed with a central portion and outwardly disposed side edge portions;
8 fabricating a hard bias structure upon said G1 layer at said outer regions such that said
9 hard bias structure is disposed proximate said side edge portions of said free magnetic layer, said
10 hard bias structure including a seed layer and a hard bias layer, wherein said hard bias structure
11 is fabricated by;
12 depositing a seed layer upon said G1 layer;
13 removing an upper portion of said seed layer to create an upper surface of said seed layer;
14 depositing hard bias material upon said upper surface of said seed layer to create a hard
15 bias layer that is disposed upon said seed layer; and
16 wherein said hard bias layer has a midplane that is disposed at a horizontal level within
17 the magnetic head that is approximately coplanar with said midplane of said free magnetic layer.

1 18. (original): A method for fabricating a magnetic head as described in claim 17 wherein
2 said hard bias layer is deposited next to said side edge portions of said free magnetic layer.

1 19. (currently amended): A method for fabricating a magnetic head as described in claim 18
2 wherein said seed layer has a thickness of approximately ~~5-40~~ 25-30 nm, and wherein said hard
3 bias layer has a thickness of approximately ~~5-30~~ 15-20 nm.

1 20. (currently amended): A method for fabricating a magnetic head as described in claim 19
2 wherein said ~~seed layer has an upper surface that has been ion milled~~ removing of an upper
3 surface of said seed layer includes ion milling said seed layer.

1 21. (currently amended): ~~A method for fabricating a magnetic head as described in claim 19~~
2 ~~wherein said seed layer is comprised of a first seed layer portion and a second seed layer portion,~~
3 ~~where said first seed layer portion has an ion milled upper surface upon which said second seed~~
4 ~~layer portion is disposed.~~— A method for fabricating a magnetic head comprising:

5 fabricating a plurality of thin film layers to create a read sensor, said read sensor
6 including a first insulation (G1) layer, a pinned layer, a pinning layer, a spacer layer, a free
7 magnetic layer having a midplane thereof, and a cap layer;

8 milling said plurality of thin films such that a central sensor region is protected from
9 milling and unprotected outer regions are milled down to said G1 layer, such that said free
10 magnetic layer is formed with a central portion and outwardly disposed side edge portions;

11 fabricating a hard bias structure upon said G1 layer at said outer regions such that said
12 hard bias structure is disposed proximate said side edge portions of said free magnetic layer, said
13 hard bias structure including a first seed layer, a second seed layer and a hard bias layer, wherein
14 said hard bias structure is fabricated by;

15 depositing said first seed layer upon said G1 layer;

16 removing an upper portion of said first seed layer to create an upper surface of said first
17 seed layer;

18 depositing said second seed layer upon said upper surface of said first seed layer;

19 depositing hard bias material upon said second seed layer to create a hard bias layer that
20 is disposed upon said second seed layer; and

21 wherein said hard bias layer has a midplane that is disposed at a horizontal level within
22 the magnetic head that is approximately coplanar with said midplane of said free magnetic layer.

1 22. (currently amended): A method for fabricating a magnetic head as described in claim 21
2 wherein said first seed layer is approximately 20-25 nm thick and said second seed layer is
3 approximately 4-10 nm thick.

1 23. (new): A method for fabricating a magnetic head as described in claim 17 wherein said
2 seed layer is formed with an initial thickness of approximately 30-40 nm, said upper portion of

3 said seed layer is approximately 6-10 nm thick, such that a final thickness of said seed layer is
4 approximately 25-30 nm.

1 24. (new): A method for fabricating a magnetic head as described in claim 17 wherein said
2 seed layer is comprised of Cr or CrMo, and said hard bias material is CoPtCr.

1 25. (new): A method for fabricating a magnetic head as described in claim 21 wherein said
2 removing said upper portions of said first seed layer includes ion milling said first seed layer.

1 26. (new): A method for fabricating a magnetic head as described in claim 21 wherein said
2 first seed layer is formed with an initial thickness of approximately 25-30 nm, said upper portion
3 of said first seed layer is approximately 4-6 nm thick, such that said first seed layer is formed
4 with a final thickness of approximately 20-25 nm.

1 27. (new): A method for fabricating a magnetic head as described in claim 21 wherein said
2 first seed layer is comprised of Cr or CrMo and said hard bias material is CoPtCr.